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Natural spectral-line broadening in atoms with unstable nuclei

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Abstract

© Published under licence by IOP Publishing Ltd. Spontaneous emission from atoms with unstable nuclei is investigated. The decay law of an unstable nucleus is shown to be not exponential and to depend on a parameter characterizing the self-interaction of the unstable nucleus. This parameter, as well as the decay width, can be extracted from the line profile. It is demonstrated on the instance of Beryllium atom with the unstable neutron-rich ^{13}Be nucleus that for light atoms this parameter may have an essential effect on their spontaneous emission spectrum. Spontaneous emission from supercritical atoms is investigated as well. Their spectrum is continuous and depends on the decay width of the supercritical nucleus. The most sensitivity to the magnitude of the decay width is observed in the X-ray band.

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